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FIBROMATA

AND

CYSTO-FIBROMATA OF THE OVARY.

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(With four woodcuts.)

It must occur to every one who has had occasion to review the literature of new growths originating from the female pelvic organs, to note how large a space is reserved for tumors of the ovary. Aside from the attention which has been bestowed on this organ, because of its immense physiological importance, and subtle influence upon the system at large, it occupies pathologically a prominent place as the site of a peculiar variety of morbid growths. In all the monographs which have been written upon ovarian tumors (especially the works of Spencer Wells, Atlee, Peaslee, Tait, and Gallez¹), it is almost entirely of the

¹ Vide also Olshausen, "Ovarien;" Kiwisch, "Dis. of Ovaries" (Clay's Trans.), etc.

cystic, seldom of the solid, type that we read. While the minute anatomy, origin, and development of the former are treated of at length, the latter are dismissed with the brief comment that they are of rare occurrence and little understood. Nor should it appear surprising that they are so imperfectly described in treatises, largely clinical in their tendency, when we remember the comparatively small size and little surgical importance of many of these tumors. That they are so rare as ordinarily represented,¹ the writer cannot believe, yet they are sufficiently uncommon to invest them with great interest. No doubt many have been overlooked during life, and even in the dead-house, while the published reports of cases are often meagre and indefinite.

As a rule, clinical writers are content to take their pathological anatomy at second-hand, so that for all the information which we possess on the tumors under consideration, we must appeal to the original sources, the works of the French and German pathologists. Aside from the short section in Virchow's great work² devoted to this subject, no special investigations had been made till the appearance of Leopold's article in 1876.³ The latter tabulates only fifty-nine cases, by no means a complete collection, as will appear from reference to a single source.⁴ Nearly all subsequent observers have referred to his paper, just as previously Virchow and Cruveilhier were quoted as chief authorities.

Leopold has certainly done much to direct the attention of pathologists to the fact that ovarian tumors are not entirely cystic in their nature, but that solid growths may originate in this region, possessing some histological, if not clinical, interest. Though the entire class will claim our careful attention, the writer has thought best in this paper to confine his observations more particularly to a small group—the fibrous tumors, because of, (1) their rare occurrence, (2) their doubtful origin, and the similarity of their structure to that of the normal ovarian stroma, (3) the appearance of similar growths in the

¹ It is rather remarkable that Leopold should have overlooked so many cases reported by English writers. Only Van Buren in America and Spencer Wells in England are credited by him, each with a single case.

² Virchow: "Geschwülste." Chap. on Fibromata.

³ Leopold: "Die soliden Eierstocksgeschwülste." Arch. f. Gyn., Bd. vi., S. 189.

⁴ Trans. London Path. Society, Vols. viii. to xxix.

uterus (less often in other organs), thus affording an opportunity for valuable comparisons, (4) the fact that there exists the same tendency to cyst-formation as in uterine fibroids.

Of Leopold's fifty-nine cases, but nineteen are examples of true fibromata, and he infers that some of these were probably sarcomata. The impossibility of drawing this sharp distinction will be referred to later. The writer has collected authentic accounts of upwards of twenty other cases, to which may be added another which came under his personal observation last winter at the Woman's Hospital.¹ In this instance, there was bilateral disease, one tumor being a large fibro-cyst, while the opposite ovary was the site of a smaller fibroma. An examination of these specimens suggested the present study.

One other similar case has come to the writer's knowledge within the last few weeks, and reference to the Transactions of the Philadelphia Obstetrical Society (Dec. 1st, 1881)² shows a report of three ovarian fibroids removed by Dr. Wm. Goodell since 1876; so that we are forced to differ with the latter gentleman when he says that "fibroid tumors of the ovary are *very* rare, so rare, indeed, that many pathologists have contended, etc." When compared with the frequency of their occurrence in the uterus, we grant that they are uncommon; and just here it is interesting to note the inverse ratio between the number of solid and cystic growths found in the two organs, suggesting a difference in the etiology of uterine and ovarian tumors. This idea will be referred to later.

Believing that light might be thrown upon the subject from more than one quarter, the writer has taken advantage of the rich pathological collection of Bellevue Hospital Medical College,³ and examined microscopically a number of fibro-cysts of the uterus, one from the kidney, and several sarcomata and carcinomata of the ovary, as well as about thirty cystomata obtained from the Woman's Hospital. All the fresh specimens removed at the latter institution during the winter have been laid under contribution. In a number of autopsies, the ovaries have been examined with reference to the presence of the so-called "fibroid" and "hyaline" degenerations, in the hope that

¹ Removed by Dr. Thomas. Patient made a good recovery.

² As reported in Supplement to AM. JOURN. OBSTET., March, 1882, p. 74.

³ In this connection the writer would express his grateful appreciation of the kindness of Dr. Welch, whose instruction he was so fortunate as to enjoy.

some information might be derived relative to the development of fibromata.

In general, Dr. Noeggerath's assertion has proved true, that a strictly normal ovary is the exception.¹ Whether any new facts have been gained by these studies or not, the writer has at least deduced one valuable lesson—that even the most careful investigators are too prone to establish a theory, and to endeavor to make their observations conform to it. No attempt is made in this paper to support any new or original theories, but simply by legitimate deductions to confirm or disapprove those which already exist. The writer has tried (as much as one can, for the personal equation in microscopy is very variable) to describe only what he *saw*, and not what he *wished to see*. Even if this course leads to a confession of ignorance, it will at least be an honest ignorance.

A glance at the literature of the subject will not be without interest. In all cases the original works have been consulted.

Astruc,² writing in 1743, says nothing of tumors of the ovary, either solid or cystic, though he describes with considerable accuracy those of the uterus, and shows that he was well acquainted with the changes to which fibroids are liable.

Kiwisch³ devotes but a few words to the subject, dismissing it with the simple statement that we find (1) solid fibroids of the ovary, and (2) cysts “with fibroid thickening,” the first class being very rare.

Simpson,⁴ writing about the same time (1845), makes no mention of these growths, nor does Bennet,⁵ whose attention was directed especially to “inflammations” of the uterus. Lee,⁶ at the same period, in a treatise on tumors of the latter organ, notes the concurrence of fibroids in the ovary and uterus, and the *identity* of structure in both cases. He quotes Mad. Boivin, to the effect that “all large solid tumors of the ovary are scirrhus”(!). West,⁷ contemporary with the above, devotes the second volume of his work to diseases of the ovary, yet without reference to fibromata. Mad. Boivin,⁸ in her original treatise,

¹ Noeggerath: On a New Method of Formation of Ovarian Cysts. AM. JOUR. OBSTET., 1880.

² Diseases of Women. Ed. 1743, Chap. xiii.

³ Dis. of the Ovaries (trans. by Clay), chap. xxiii.

⁴ Dis. of Women.

⁵ On the Uterus.

⁶ Tumors of the Uterus; Jacksonian Prize Dissertation, London, 1847.

⁷ Dis. of Women. Vol. II. On the Ovaries.

⁸ Treatise on Dis. of the Uterus. Eng. trans., 1834, Chap. iv., p. 477.

says that "tumors of this kind (*i. e.*, fibrous) are sometimes attached to the ovarium, as well as to the uterus, or formed in its tissue like globules." Tilt,¹ while developing at length his peculiar ideas on ovaritis, makes no allusion to hypertrophies, or new growths of the organ. In France, however, Colombat² had already noted "scirrhous induration" (perhaps following Boivin), and refers clearly to "fibrous transformations of the ovary, which bear a strong analogy to those of the uterus," etc. Velpeau³ mentions uterine, but nowhere ovarian, fibroids.

Other English authors of later date are equally cursory in the attention which they give to the subject, though at this very time reports of undoubted cases were frequently made at the London Pathological Society.⁴

Bright⁵ mentions but one case, which may have been a fibroma of the ovary. McClintock⁶ is equally unsatisfactory, quoting from Paget,⁷ who himself speaks only of "fibroid cancer." Hewitt⁸ refers to the "rare fibrous tumors of slow growth and comparatively harmless," while Tait,⁹ in his last edition, makes the strange remark that "growth of the fibrous stroma of the ovary, so as to form a large abdominal tumor requiring removal, has not yet been described." He admits that he has seen but two cases of ovarian fibromata, "one of which was malignant." Athill¹⁰ says nothing of this variety of tumors. Duncan¹¹ merely hints at a possible hypertrophy, "which may be called areolar hyperplasia, or increase of fibrous tissue." In their last edition, West and Duncan¹² note that "solid tumors of the ovary are comparatively rare," and that they have never met with one. Reference is made by them to Leopold's paper.

According to Barnes,¹³ "fibrous or fibro-muscular tumors of

¹ Dis. of Menstruation and Ovarian Inflammation.

² Diseases of Females. Trans. by Meigs, 1845.

³ Mémoire sur l'Anat. Path. des Tumeurs Fibreuses de l'Utérus, 1842.

⁴ Vols. ix.-xxviii., Trans.

⁵ Clin. Memoirs on Abdom. Tumors.

⁶ Clin. Memoirs on Dis. of Women, p. 114.

⁷ Surgical Path.

⁸ Dis. of Women, p. 699.

⁹ Dis. of Women, Wood's Ed., p. 148, also Prize Essay on Ov. Dis., Brit. Med. Journal, Vol. i., 1874. He only speaks of the rarity of "fibromyomatous" tumors of the ovary.

¹⁰ Dis. of Women, 5th ed.

¹¹ Clin. Lect. on Dis. of Women, ed. 1881, p. 27.

¹² Dis. of Women, last Ed., p. 588.

¹³ Dis. of Women, last Ed., p. 283, seq.

ovary are so rare that their existence has been doubted . . . at the same time there is a sound histological reason for admitting the possibility, etc." "A true fibrous tumor of the ovary," says Spencer Wells,¹ "is a thing of very rare² occurrence, so rare indeed, that until the present year not one, distinctly characterized and taking its origin in the ovarian tissues, ever came under my observation." In fact, he is sceptical as to the origin of these growths, believing that their true site is in the uterus. Kiwisch is quoted as reporting two cases, though the writer has not found them mentioned elsewhere. In a work by Edis,³ giving presumably the latest English views upon gynecology, it is stated that "fibroma is exceedingly rare . . . seems to be due to hypertrophy of the ovarian stroma." Among modern French writers on diseases of women, we note hastily Becquerel,⁴ who recognizes the existence of fibrous growths, but confounds them with "fibrous cysts." Courty,⁵ who simply mentions them, and Demarquay⁶ who is silent. Nonat⁷ remarks "L'histoire de ces sortes de lésions est entourée d'obscurité," Gallez⁸ merely hints at the formation of cysts in solid fibrous tumors of the ovary. Sinéty,⁹ the latest French authority, devotes but little space to the subject, but suggests that the growths are less rare than is supposed, and are probably often overlooked during life. The pathologists are more satisfactory in their statements. Cruveilhier¹⁰ does not seem to regard the condition as a very uncommon one, while Cornil and Ranvier¹¹ allude to the occurrence of ovarian fibroids and their structure.¹² The Germans, with their characteristic thoroughness, treat the subject at greater length. Aside from the carefully reported

¹ Dis. of the Ovaries, p. 49.

² Knowsley Thornton (Trans. Lond. Path. Soc., Vol. xxix., p. 169) thinks it remarkable that he has only seen three solid ovarian tumors in 500 cases, "considering the changes, which take place in the stroma from youth to age."

³ Dis. of Women, 1882, p. 282, seq.

⁴ Maladies de l'Utérus. Tome ii., p. 266.

⁵ Mal. de l'Utérus, p. 813-939.

⁶ Traité Clin. des Mal. de l'Utérus, p. 280.

⁷ Mal. de l'Utérus, p. 889.

⁸ Hist. des Kystes de l'Ovaire, p. 40.

⁹ Manuel Prat. de Gynécologie, p. 629.

¹⁰ Traité d'Anat. Path., p. 702.

¹¹ Path. Hist.

¹² Boinet (Mal. des Ovaires) describes "Tumeurs Fibreuses," but obscurely.

cases by Leopold and others,¹ to which subsequent reference will be made, we find in Schroeder² a short but clear account of these tumors; Olshausen³ describes them and mentions several cases. Among the treatises on pathological anatomy, Virchow's⁴ work, already alluded to, furnishes us with considerable information. He notes also the interesting fact that this condition of the ovary has been seen in various domestic animals, as well in the human female, though in no case has he met with these fibrous bodies of any great size. Rokitansky⁵ speaks of "the anomalous production of fibrous tissue" in the ovary, but does not appear to recognize such tumors as form the subject of this paper, since his variety are "rarely larger than a pea."

Rindfleisch⁶ describes a "hypertrophia notha ovariorum." Klebs⁷ mentions sarcomata of the ovary, which, from the description, do not seem to differ from fibromata. He has some peculiar ideas regarding the origin of these bodies. Klob⁸ is sceptical as to fibroids originating elsewhere than in the uterus, and thinks that, even where they seem to arise from the adnexa, a pedicle will be found attached to the fundus. Scanzoni⁹ has seen but four cases, Beigel¹⁰ cites three, and comments on their rarity. Gussacrow¹¹ says nothing of ovarian fibromata.¹²

Among American writers we note of course Atlee¹³ and Peaslee,¹⁴ the former of whom thinks that "it is *exceedingly rare* (his own italics) to meet with a *hard fibrous tumor of the ovary*," and "when a tumor possessing the usual characteristics of a fibroid—being hard, solid, non-fluctuating—is found in the abdominal cavity, we may, as a general rule, decide it to be uterine." "Fibroids of the ovarian stroma are *very rare* (Peaslee¹⁵), and do not often exceed the size of a goose-egg."

¹ Archiv für Gyn.

² Weibl. Geschlechtsorgane, last ed., p. 411.

³ Ovarien, p. 415, etc.

⁴ Geschwülste, Art. Fibromata.

⁵ Path. Anat., vol. ii., Syd. Trans., p. 252.

⁶ Path. Gewebelehre u. Anat., p. 464.

⁷ Handbuch der Path. Anat., Tome ii., p. 822 and 829.

⁸ Path. Anat. Female Sex. Organs, Trans., p. 163, 161.

⁹ Weibl. Sexualorgane (French trans.), p. 356.

¹⁰ Krankheiten des weibl. Geschlechts, p. 444.

¹¹ Neubildungen des Uterus. Billroth's Allgem. u. Spec. Chirurgie.

¹² Diag. der Eierstockstumoren. Volkmann's Clin. Vorträge; no remark on fibromata.

¹³ Ovarian Tumors, p. 262.

¹⁴ Ovarian Tumors.

¹⁵ Ovarian Tumors, p. 25.

This author reports only two cases. Bedford¹ is silent with regard to the subject. Churchill² simply says that "fibromata of the ovary are identical with those of the uterus." No cause is known for them, he says. Goodell's³ experience is summed up in the clinical report already alluded to. Sims⁴ in his "Uterine Surgery" and clinical reports, seems to have met with no cases. Emmet⁵ has seen ovarian fibroids, but too small for operation; Thomas⁶ considers them as rare and calls attention to the distinction between true cysto-fibromata and fibroid cysts, quoting Farre as to the probable origin of the larger growths from the uterus. Dr. Thomas mentions a recent undoubted case of his own. This hasty review of the prevailing opinions of various authors with regard to the present subject will prepare us to better appreciate the difficulties which lie before us, in dealing with a theme hitherto so lightly touched upon.

The investigation naturally takes a twofold course, leading to (1), the consideration of fibromata of the ovary, (2), to the more difficult study of cyst-formation in these tumors.

It will be unnecessary to repeat the description of an ordinary fibrous⁷ growth, such as may be found in various regions of the body,⁸ and is so readily recognized by the surgeon. Macroscopically there is little danger of mistaking one (unless degeneration be far advanced), while the microscopical appearances are pictured in every modern text-book. But even though the main features of the class are so familiar, to say that all of these tumors are identical in their structure would be erroneous. One of the most interesting facts with regard to new formations, whether we accept the theory of Waldeyer,⁹ or that of Cohnheim,¹⁰ as to their origin, is the modification which they undergo in different situations¹¹—an effort (to use a modern scientific

¹ Dis. of Women, 1857.

² Dis. of Women.

³ Sup. AM. JOURNAL. OBSTET., Mch., 1882.

⁴ Vide also cases in AM. JOURNAL. OBSTET.

⁵ Gynecology, p. 775.

⁶ Dis. of Women, p. 675.

⁷ The words "fibroma," "fibroid," "fibrous growths," etc., are used synonymously, no such artificial distinction being made between them as is attempted by some surgical authors.

⁸ Vide cases of such tumors arising from different regions, as mentioned in Erichsen, last ed.

⁹ Ueber den Krebs.

¹⁰ Allgem. Pathologie.

¹¹ Thus Lücke (Lehre der Geschwülste, p. 133): "Die Form des Bindegewebes und etwaige accidentelle Elemente in den Fibromen hängen von der Art des Mutterbodens ab."

phrase) to adapt themselves to their environment. Thus each morbid growth within an organ seems to be stamped with some of the peculiar histological features of the adjacent normal tissue, so that we can almost imagine that we read at a glance the life-history. Even with the heterologous group¹ this is, to a certain extent, the case—how much more striking in the case of those bodies which appear to be simply hypertrophies of the original organ.

This is especially true as regards the simple tumors of the female genital organs,² where, in the writer's opinion, the embryonic theory of development is often unnecessary, however logical its deductions elsewhere. Who can study carefully the structure of a uterine fibroid, in a section made through the line of demarcation between normal and morbid tissue, and not be content to rest with the explanation of its direct origin, instead of imagining the existence of latent pre-natal elements?³ And in the ovarian fibroid, particularly, there is a close resemblance between the normal and pathological, so that at first glance the idea of an hypertrophy of the pre-existing stroma is suggested; the more one studies the subject the more definite becomes this idea. Here are the same peculiar spindle-cells, the identical "fibro-sarcomatous" structure, with which we are so familiar in the normal section, the "straffes, welliges Bindegewebe" of German writers.⁴

In the single specimen⁵ examined by the writer, the main fea-

¹ The writer has been struck with this in examining the "mixed" tumors of the testicle and parotid.

² Reference is made especially to fibromata and sarcomata. Klebs (as quoted by Emmet, op. cit., p. 518) gives a very satisfactory account of the origin of uterine fibroids. His view of their development certainly corresponds with the results of microscopical examination.

³ Cohnheim, loc. cit.

⁴ Leopold, "Die soliden Eierstocksgeschwülste," A. für Gyn., Bd. vi., p. 189, etc.

⁵ Not having been present at the operation, it is impossible to state definitely the relation of the tumor to the tube and broad ligament. These points are seldom reported clearly in the hospital records, so that it is necessary to judge somewhat by the general appearance of a specimen when received. It is certain that the growth occupied the site of the ovary, and had no connection with the uterus.

Much confusion exists in different works between fibrous and sarcomatous growths of the ovary, one or the other name being applied according to the prevailing tissue. By the term "fibro-sarcoma," the writer recognizes an attempt to reconcile diverse opinions as to the essential character of the growths under consideration. Vide Thomas, op. cit., p. 677.

tures were as follows: a smooth, hard, lobulated mass, somewhat oval in shape, the size of a pullet's egg, dimensions about 3x2 centimetres, weight 100–120 grammes. No separate capsule, pedicle apparently very short, no trace of tube or broad ligament. Nothing remaining to suggest portions of the normal ovary. In short, it corresponded closely in outward appearance with the usual descriptions of small ovarian fibromata. Section of the mass showed a firm, homogeneous structure, intermediate in density between that of the hard fibrous bodies growing from the lobule of the ear,¹ and the cut section of an ordinary uterine fibro-myoma. There was perhaps a closer interlacing of fibres in the ovarian growth, and the tissue itself was more delicate than was noted in specimens of the latter class. Aside from the common features of such connective tissue, the prevalence of spindle-cells was remarked, and on careful comparison with similar elements in the so-called "fibro-myomata," and fibro-cysts of the uterus, the writer was unable to satisfy himself in his own mind of the essential difference between the spindle-shaped bodies seen in both instances. By isolating separate fibres, it was indeed clear that the spindle-cells of the tumor under consideration were smaller and less defined than in the other specimens, that they bore a close resemblance to the characteristic elements of sarcoma, but, with the methods of staining employed,² repeated examinations have not convinced the writer of the value of the presence or absence of smooth muscle-fibre as an element in the differential diagnosis. Even Virchow,³ who is universally quoted as upholding this distinction, after saying that ovarian fibroids must not be compared with uterine, as much as they resemble each other, admits that "it is very difficult to distinguish undeveloped, or atrophied, smooth muscular fibres from connective-tissue cells. Sometimes we cannot tell the difference." To pursue this discussion intelligently, we shall be obliged to digress somewhat, and consider briefly the much-vexed question as to whether smooth muscle-fibres do, or do not, exist in the normal ovary. Opinions are pretty evenly divided, Koeberlé⁴

¹ On examination of one of these small, hard tumors, we are prepared to appreciate the fact that these are genuine fibromata, in the sense that they are essentially fibrous-tissue formations. Perhaps, in distinction from these, some authors would call other tumors of this class fibroids.

² The ordinary double staining with hematoxylin and eosin, the sections being examined in glycerin and oil of cloves.

³ Op. cit., p. 414, tome iii.

⁴ Nouveau Dict. de Méd. et Chirurgie, art. Ovaires, p. 469.

inclining to the affirmative, Rouget¹ being notably a supporter of this doctrine, Waldeyer² admitting it, though with limitations. In the latter's view the muscular fibres are limited to the "vascular zone;" he also speaks of them as "surrounding the large and medium-sized arteries, etc." Klebs³ and Aeby⁴ think that a large part of the ovarian stroma is composed of muscle-fibres. His⁵ is even more sweeping in his statements; Kölliker⁶ sides with Waldeyer. Jacobi⁷ thinks that the muscular fibre-cells are "rudimentary, superficial," and that "even these cannot be demonstrated, except upon the pregnant or recently parturient woman." Henle⁸ adopts the negative side of the question, Grohe⁹ admits that he has seen these cells in the ovaries of infants, less certainly in those of adults. Liégeois¹⁰ admits their existence in "la portion bulbeuse." Numerous other writers¹¹ either quote from the above, express the same views slightly modified, or carefully avoid committing themselves to either opinion,¹² the latter class being, in the present state of knowledge, by far the most judicious. Such being the position of authors in respect to the structure of the normal ovary, we can readily understand why there should be a lack of unanimity when the morbid growth is examined. Without quoting at length the evidence pro and contra, it may be stated briefly that the majority of observers have confirmed by observation (or copied) the ideas of Virchow, though a few, not wanting in authority, have ventured to differ from him.¹³ A large number take the position that true fibro-

¹ Vide elaborate article in Brown-Séquard's *Jour. de Phys.*, 1858, vol. i., p. 336, etc.

² Stricker's *Handbook* (Syd. trans.), art. Ovaries, vol. ii., p. 169.

³ *Eierstock der Wirbelthiere.* Virchow's *Arch.*, Bd. xxviii.

⁴ Du Bois-Reymond's *Arch. f. Anat. u. Phys.*

⁵ Schultze's *Arch. f. Micr. Anat.*, 1865, vol. i., p. 173.

⁶ *Hist. Anat.*

⁷ *Question of Rest for Women*, p. 90.

⁸ *Anatomie*, tome iii., p. 502.

⁹ Ueber den Bau des menschl. Eierstocks. *Virch. Arch.*, vol. xxvi., p. 278.

¹⁰ *Traité de Physiologie*, chap. Ovaires," p. 227.

¹¹ Barnes, *op. cit.*, p. 283.

¹² For example, Savage, Graily Hewitt, et al.; or, to mention works lately published in New York, and presumably up to date, Lusk and Satterthwaite. Lusk in his "Science and Art of Midwifery" omits all reference to the subject (p. 21). The latter copies the old ideas of Waldeyer without change (vide "Histology").

¹³ Koeberlé, *loc. cit.*, who believes in presence of muscle fibres in normal ovary, says, "Les myofibromes des ovaires me paraissent très-problema-

myomata are found occupying the site of the ovary, but that in every case where careful examination reveals the presence of muscular fibres, the tumor will be found to have originated from the uterine tissue. We shall pursue the discussion no farther. The writer's views have already been stated, regarding the structure of the fibrous growth, and he prefers to preserve a similar attitude with respect to the normal stroma. Until some more certain methods of examination are discovered than either the treating of fresh specimens with acetic acid, or the staining of hardened sections, it is difficult to see how any one can express such a positive opinion as Noeggerath,¹ or how the presence of a few doubtful fibres can suffice to establish the origin of a pelvic growth.² To sum up the results of the study of our specimen—it presents the ordinary connective-tissue basis of the class to which it belongs, showing, however, a higher grade of development³ than is possessed by similar tumors elsewhere in the body, as denoted by the prevalence of cellular elements, so that in another locality it might have been called a sarcoma, but, observing its close resemblance to the normal organ, we recognize it as a true fibroma, stamped with the peculiar marks of its origin. And, lastly, we note on comparison with leio-myomata of the uterus, a difference, more in the gross than in the minute anatomy, a finer, denser arrangement of fibres, less vascularity, and the absence of a capsule; the prevailing cellular elements

tiques," an apparent inconsistency. Leopold (loc. cit.) follows Virchow, also Lücke ("Lehre von den Geschwülsten," p. 131); vide also Todd's Cyc. of Anat., art. Ovaries. Most of the gynecologists support the view of the non-occurrence of fibres (Spencer Wells, Tait); Rindfleisch and Billroth go so far as to deny that there are even found such smooth muscle fibres in uterine fibroids. Wilks (Barnes' "Diseases of Women," p. 283), and Wilson Fox assert the valueless use of this test in differential diagnosis, opposing Bristowe and Hutchinson. Sangalli (Storia dei Tumori) quotes an undoubted case of pure fibro-myoma of the ovary.

¹ AMERICAN JOURNAL OF OBSTETRICS, January, 1880, paper on a "New Method of Formation of Ovarian Cysts." He seems to think that most of the spindle cells found on section are smooth muscle-fibres. He has examined many ovaries wherein these fibres were "confined entirely to the vessel wall."

² Klob (as quoted by Leopold) adheres to a modified opinion, thinking that ovarian fibroids differ from uterine in the *predominance* of connective tissue over muscle fibres. This is a very suggestive thought, and better than a positive negation without sufficient evidence.

³ Instead of saying that this tumor possessed a "higher grade of development," it might be better to say that it showed a greater tendency to pass into another type.

in the two cases appearing to differ in size and distinctness of outline, rather than in distribution or arrangement.¹ A word as to the origin of ovarian fibroids before passing to the second division of our subject.

The writer's views have been hinted at in the introduction. The current ideas respecting the etiology of morbid growths are sufficiently familiar.² Cohnheim's theory is a very attractive one, but even he does not argue quite so confidently with regard to the origin of fibromata, as in the case of other tumors. The definition of tumor which he lays down in the beginning, "eine Abweichung der Gewebezunahme vom morphologisch-anatomischen Typus der Localität," hampers him when he comes to consider a class whose structure bears so close a resemblance to the "Typus der Localität." At least, he pleads, we can grant that his theory holds in cases of "multiple fibromata."³ If he had looked to the ovary for confirmation, we venture to affirm that the result would have been disappointing. Nor need we, in our case, expect to discover a process of development from pre-existing normal tissue. Virchow has indeed described the fibrous growths as commencing at the periphery of the organ, and gradually absorbing the stroma, until either only a small portion of the normal tissue is left intact, or its site is occupied by the new formation.⁴ Lücke⁵ (also Cohnheim⁶) refers to a central and peripheral mode of growth, the latter at the expense of the normal tissue. Irritative processes have been noticed at the supposed line of demarcation,⁷ but never a defi-

¹ Comp. Lücke (loc. cit.), p. 132. "In pure fibromata we find, as cell-elements, only the well-known connective-tissue nuclei . . . yet the more highly developed forms of connective-tissue cells (especially spindle and round) may be seen, and, by an increase of the cellular elements over the fibres, we get the transition forms—die so-genannten Fibrosarcomata."

² Vide Cohnheim, Allg. Path., vol. i., p. 630-638. He here expands his theory of embryonic origin. Waldeyer (Ueber den Krebs, Volk. Klin. Vorträge, No. 33, p. 176) formulates his idea of growth from normal epithelium. Lücke (op. cit., p. 134), origin of fibromata from local irritation; vide also Virchow (Tumeurs), introductory chapter. Billroth, Surg. Path., chapter on "Tumors."

³ Op. cit., p. 640.

⁴ Similar opinion expressed by Sinéty, op. cit., p. 629.

⁵ Op. cit.

⁶ Op. cit., p. 671. "So muss nothwendig überall da, wo die Geschwulstmasse Platz greift, normales Gewebe verloren gehen."

⁷ Virchow, et al. Duncan (Lectures on Dis. of Women) would refer "hy-

nite boundary between the normal and pathological. An attempt has been made to fix the exact locality in the ovary whence arose the first beginnings of the tumor. The writer has been able to collect only four authentic cases of fibrous bodies arising from the *corpus luteum*,¹ so that the statement of Klebs² is rather surprising: that "a *great part* of the ovarian fibromata" originate thus. Of more importance is the study of the "corpora fibrosa," so long recognized,³ but not thoroughly investigated till recently.⁴ They have been studied in connection with the present subject, but the results obtained were mostly negative. The writer agrees with the conclusions reached in Patenko's article, that these bodies are simply local scleroses, having their origin in the walls of the follicles, that they are always circumscribed, and that, though by the union of adjacent corpora fibrosa, patches of some size may be formed, they do not themselves ever form appreciable tumors. It is a fact that, in the stroma surrounding them, there is often noticed an increase in the number of cell-elements. Whether we have here evidences of a local irritation, leading to general hyperplasia or not, we cannot say. At present, these bodies are to be regarded as curiosities in an organ which abounds in inexplicable things.⁵

hypertrophy" of the ovary to a pre-existing chronic ovaritis. There is a great leaning in this direction among gynecologists. As Emmet honestly confesses (and the writer has verified this at autopsies), the ovary is regarded clinically as the seat of many affections which are not found to be present after death.

¹ Rokitansky, two cases; Klob, one case. Jenks (AM. JOURN. OBST., vol. vi., p. 106) reported an undoubted case.

² Handbuch der path. Anat., tome ii., p. 829.

³ Virchow ("Geschwülste") says: "There may be a granular degeneration or cirrhosis in the ovary, . . . but this is only a chronic oöphoritis, and *not* a tumor." He refers these changes to the Graafian follicle, which observation is confirmed and expanded by Potenko. Perhaps Virchow meant the "corpora fibrosa."

⁴ Patenko: "Ueber die Entwicklung der Corp. Fibrosa in Ovarien." Virchow's Archiv, 84, p. 194 et seq. Birch-Hirschfeld (Lehrbuch der path. Anat., p. 1,100) speaks of the "hypertrophied cicatrices of Graafian follicles." He confuses the subject by stating as he does: "Häufiger enthalten die fibrösen Geschwülste zahlreiche Muskelfasern, so dass sie als Myome (!) zu bezeichnen sind."

⁵ In the sections of corp. fibrosa examined by the writer, the stroma in general seemed denser than usual. There were hemorrhages into the interstices of the tissue, as well as into the fibrous bodies themselves. In one section there was an immense number of yellow pigment-cells with large central nuclei. Spindle cells were abundant and unusually large, also numbers of round and branched connective-tissue cells, but nothing suggesting a general hyperplasia.

Like the hyaline metamorphoses, the local hemorrhages, large pigment-cells, and other anomalous appearances so frequently encountered here, we can merely guess at their pathological import. There remains only one other theory to account for the origin of fibromata of the ovary (and the present specimen in particular), and that is the most natural one in the world—an increase in the normal stroma. It was the explanation which first suggested itself to observers, and it is difficult to see how it can be improved upon.¹ Our tumor was proved to be homogeneous throughout, with nowhere any trace of follicular remains. There were no evidences of hemorrhages, no appearances suggestive of inflammatory processes. Compared with the normal sections, the only difference seemed to consist in the greater density of the tissue in the morbid specimen, combined with an increase in the number of spindle-cells. But it was the stroma, and that portion of the organ alone, which had its counterpart in the fibroma, if we except the firm, whitish layer of connective tissue at the periphery of the tumor, which recalled the *tunica albuginea*. If any of the original ovarian tissue had remained, it would have been impossible to differentiate between it and the new-formed material. It is surely logical to regard the present as a case of simple hyperplasia of the stroma, without resorting to the supposition that there was a preceding chronic ovaritis,² of which there is no evidence. This term

¹ Rindfleisch (op. cit., p. 464): "Hypertrophia notha ovariorum," defined as "hyperplasia of the stroma, so that the ovaries can enlarge to the size of the fist." Virchow speaks of these tumors as "hyperplastic growths which arise from a pre-existing fibro-muscular tissue by a progressive increase in that tissue." Leopold infers that they arise by "gradual hypertrophy of the *whole* ovary." Waldeyer (Archiv f. Gyn., vol. ii., p. 440) calls attention to an ovarian fibroma as looking just like the enlarged organ. Birch-Hirschfeld makes a distinction: "Während diffuse Hypertrophie des Ovarialstroma ziemlich oft vorkommt, werden fibromatöse Geschwülste dieses Organs relativ selten beobachtet." It is doubtful if this will hold good. "Fibroma of the stroma of the ovary," says Peaslee, "is histologically simply a diffuse proliferation of the connective tissue of that organ." (Ovarian Tumors, p. 24.) "A preponderance of the muscular tissue (*i. e.*, in uterine fibroids) is rare; in general, the formation of the muscular substance runs parallel with the vascular development, and the richer nutritive supply thus originating" (Klebs, loc. cit.).

² In employing the words "hyperplasia," "hypertrophy," the writer has in mind a passage in the introductory chapter of Flint's "Practice," last edition (*i. e.*, article on Hypertrophy, p. 41). "Two forms of hypertrophy have been distinguished, viz., *simple* or *true hypertrophy* and *numer-*

"ovaritis" is too often a mischievous one, employed by gynecologists to render still more obscure a supposed pathological condition. As regards the direct cause of these hyperplasiae, the writer can offer no satisfactory explanation. Lücke,¹ of course, urges his peculiar ideas of local irritation. Ræce² seems to be an uncertain element. Age is not without influence, fibrous growths being the product of the youthful and active, not of the senile ovary.³ The influence of antecedent inflammation⁴ has been alluded to. That there is a chronic hyperplastic condition of the ovary, we have noted at autopsies, but whether it is a similar process to the one under consideration or not, or what its relation is to the occurrence of large fibrous tumors (some of which grow to the size of sixty to eighty pounds) we can only surmise. Knowing how frequently the organ is the seat of other morbid growths, it is surprising that the former varieties are met with so rarely. That the large fibroids found in this region⁵ should result from a similar hyperplasia, we see no reason to doubt, less we believe that there may be two separate varieties. Undoubtedly some of these fibromata (such as the one examined) never reach any considerable size, the density of

ical hypertrophy or hyperplasia. It is not practicable to carry out this distinction, as the two forms of hypertrophy are frequently combined," or "areolar hyperplasia" of Duncan. For account of a very large tumor of ovary vide article by Spiegelberg, Schmidt's Jahrbuch, 1867; also Van Buren's cases, loc. cit.

¹ Op. cit., p. 134.

² In reports of between thirty-five and forty cases, no stress is laid upon the fact of the patient being of the African race.

³ Idem, "Im Ganzen kann man sagen, dass das höhere Alter für die Entwicklung rein bindegewebiger Geschwülste nicht disponirt." Average age, 20 to 40. "They (ovarian fibroids) often occur in *young* women, but are uncommon, except when they form a portion of a cystic tumor."—Lloyd Roberts (Brit. Med. Journ., vol. i., 1872). Rather a contradictory statement.

⁴ Ensues most frequently as a consequence of oöphoritis, and both ovaries are generally affected, but remain of small size" (Peaslee). "The most common diseases of the ovary are due to incomplete or perverted function" (Tait-Hastings Prize Essay, on the "Ovaries," Br. Med. Journ., vol. i., 1874).

⁵ The writer accepts the view that the *large*, as well as the *small* tumors of this class may originate *in the ovary*, the contrary being held by most authors. Many authors utterly reject the theory that fibrous tumors of large size arise primarily from the ovary. If such a body is found entirely separate from the uterus, with its own pedicle, vascular supply, etc., what more can be offered to prove that it is of strictly ovarian origin? If it grew from the uterus, there would certainly be some change in that organ itself, whereas it is often found perfectly normal.

the tissue and poor vascular supply pointing to a slow and limited growth; while others, of softer texture and richer in blood-vessels,¹ grow rapidly, and equal in dimensions the largest uterine tumors. But there are other influences which account for the difference of development in fibroids, which have, as the writer believes, a similar origin. These we shall now consider. The study of the changes which take place in the interior of fibroid tumors is no new one. Long before Virchow described them, Astruc,² in his quaint old work, had given a remarkably intelligent account of "Incisted Tumors of the Uterus." In fact, the macroscopic appearances of these growths are so evident that no surgeon could have failed, even on a first examination, to inquire as to their cause. In an age when speculation was rife, there was no lack of theories as to the origin of the curious cavities so often found in new formations, and even now, with all the light of modern research, we have not yet been able entirely to discard those same ideas of the past; in fact, experience has shown that the old observers made some very shrewd guesses in their day. "Niemals ein Neoplasma sich spontan zurückbildet," says a writer on general pathology,³ a statement which can hardly be made so positively, since there are always exceptional cases which never come to an autopsy. The life-history of tumors is a very varied one, for, while some preserve throughout the same characteristics that marked their youth, others hasten on to a premature decay, losing all of the features peculiar to them in the beginning. Moreover, each class differs in the kind and degree of degenerative changes which it may undergo. Of all neoplastic growths, we shall find none subject to a greater variety of retrograde processes than the fibrous. Every one who has examined carefully a large number of fibroids, has remarked the fact that there are few in which, either macroscopically or on minute inspection, such changes cannot be found. Though we are to consider only a single form of degeneration, the cystic, we shall find it necessary to refer to nearly all of the other kinds, since they seldom exist independently. Nor shall we meet with evidences of degeneration alone, since other appearances are often

¹ All writers concur in this. The larger size of the fibro-cysts, as compared with solid fibromata, is a matter of constant observation.

² Loc. cit., chapter xiii, p. 232.

³ Cohnheim, op. cit., p. 658. He also speaks here of "die physiologische Widerstandsfähigkeit" of tumors.

present, which cannot strictly be classed with the former. We shall be able, in this connection, to study fibro-cysts of the uterus, as well as those of the ovary, since their mode of origin and structure are identical.

Changes in fibrous tumors have been variously spoken of as "hemorrhagic," "lymphangiectatic," "thrombotic," "necrotic." or "gangrenous,"² "fatty degenerative," "colloid,"³ "myxomatous,"⁴ "mucoid,"⁵ "schleimige Erweichung,"⁶ "ödematöse Erweichung."⁷ The expressions "general edema," "sarcomatous,"⁸ "cystic," "cystic softening,"⁹ and other terms,¹⁰ have been applied from real or fancied resemblances. All of the above transformations have been urged to account for the formation of cysts, yet the common error has been that the presence of any one of the processes should be thought sufficient: we shall see that the change is by no means a simple one. It would appear at first sight as if the ground had been pretty thoroughly covered, but the great majority of observers have contented themselves with hasty examinations, or simply copied the theories of others. It will be advisable to sift out the original material,¹¹ and to compare our results with it, as we proceed in the study.

Some time before he became acquainted with the subject

¹ In this connection, we also meet with the expression "phlebectatic," "ectasie," "angiomatous," "lymphatic edema," "lacteal cyst," etc.

² "Granular degeneration."

³ Id., Leopold et al.

⁴ Klebs, Heer (Inaugural Dis., Zürich).

⁵ Name suggested by Dr. Welch; have not seen it elsewhere.

⁶ Lücke, op. cit.

⁷ Heer and many others, as Schmidt (Schmidt's Jahrbücher, 1866, p. 129).

⁸ Heer probably had in mind the passage in Lücke already quoted, where an increased growth of spindle-cells is said to make a "fibro-sarcomatous" type.

⁹ "Pseudocystic"—Schmidt.

¹⁰ "Ossification," "calcification," "cartilaginous transformation," "cancerous (?) degeneration" will not concern us. A discussion as to whether the latter process ever occurs in fibroids would be irrelevant. Cruveilhier says, "*Non, mille fois, non!*" Others think differently. Schmidt uses the terms "gallertartig," "fibro-colloid."

¹¹ The writer has been unable to find anything new on the subject since the early investigations of Virchow and Cruveilhier. Others assuming at the start the truth of these great teachers' statements, have never sought to disprove, but only to elaborate them.

The matter for surprise is that so many have been able to see just what the original investigators described.

through the literature, the writer had observed the peculiar spots of softening, seen on section of fibroid tumors, known to foreign microscopists as the "geodes" of Cruveilhier—in this country sometimes spoken of as "edematous patches." He noted, as many others had previously done, their apparently gelatinous or colloid consistency on gross inspection, suggesting a similar material found in the umbilical cord. On a hasty microscopic examination, the resemblance to the so-called "mucoid" tissue seemed close enough to awaken the thought, perhaps here is a mysterious mucoid transformation occurring in the very midst of a firm, dense fibrous tissue; how or why, it is impossible to say, since there exists no analogous condition in the normal tissues. Other sections through these semi-solid masses suggested myxomatous changes, such as the writer had recently encountered in examining composite tumors of the breast, especially those of the sarcomatous and adenomatous type. But this idea was equally unsatisfactory, since there was nothing to account for the appearance of these small and scattered islets, surrounded on all sides by the unchanged fibrous basis of the tumor. Although "geodes" were found as large as a small walnut (but still exhibiting the same features as the most minute ones), it was difficult to persuade one's self that any intimate relation could exist between these and the immense cavities which procure for these tumors the name "fibro-cysts," or, as we prefer to call them, "cysto-fibromata." Previous careful study of the origin and development of true ovarian cystomata had prepared the author to appreciate the difference between these forms and those of uterine origin. But the adeno-cystomata bear in their interior clear traces of the source from which they spring. Not so with the large cysts, secondary to fibrous enlargement. Any inferences as to their original growth, drawn from an examination of the walls of the latter, would be most incomplete—in fact, we should argue a process of decay, rather than one of growth.

The writer would have it distinctly understood that he does not consider the pseudo-cysts,² often found in the large tumors,

¹ The term "fibro-cyst" might be confounded with a totally different expression, *i. e.*, "fibrous cyst." The name "cysto-fibroma" (rarely used in literature), like "fibroma" itself, is self-defining—a fibroma containing one or more cysts.

² Interesting in this connection was a specimen obtained a few days since from Dr. Thomas, consisting of the uterus and both ovaries removed

resulting from extensive hemorrhages, fatty degeneration, or, literally, necrotic softening,¹ since they are not cysts at all. However, though these processes are not regarded as the original agents in true cyst-formation, their aid will be invoked to account for the later changes which may appear.

The only veritable cysto-fibroma of the ovary which the writer has observed was a companion to the fibroma already described, springing from the opposite ovary, and removed at the same operation. It was as large as a fetal head, possessed no capsule, and sustained to the Fallopian tube and broad ligament the usual relation seen in solid ovarian growths, that is, grew free from them.² In consistence, as well as shape, it offered a marked contrast to the smaller tumor, being round, non-lobulated, and slightly doughy on palpation. On section, the contrast was heightened, for instead of a firm, dry, glistening surface, there appeared a soft, succulent tissue, from which fluid could be readily squeezed. In the centre of the mass was a cyst the size of an orange, filled with a thin sanio-serous fluid, spontaneously coagulable. The wall of the cavity was smooth and regular, showing neither hemorrhagic nor necrosed spots; the tissue immediately adjacent was more condensed³ than elsewhere throughout the tumor. Patches resembling "geodes" were few. The fresh fluid yielded on microscopic examination fibrin and blood-corpuscles, but no other morphological elements; neither was any epithelium observed in the scrapings from the walls. The usual chemical tests were valueless on account of the addition of blood to the original contents of the cyst. The tumor being hardened and sections made in the usual manner, it was found to be a fibroma closely resembling the former one in minute

by laparotomy. Growing from the former was a large mural fibroid (size of man's head), in the interior of which was a large cavity filled with sanious fluid, and a loose, hard mass the size of goose-egg. Section of the latter showed only a limited degree of degeneration, the fibrous tissue being completely preserved. Section through the smooth wall of the cavity gave like results. Here was an interesting example of necrotic change, so gradual that the density of the affected tissue was not affected. Yet no one would call such a cavity a "cyst."

¹ In a few cases (Klebs et al.), a real pus-cavity has been found in the centre of a fibroid, but not limited, and without a pyogenic membrane.

² Leopold, loc. cit.

³ This expression is used to denote fibrous tissue in which the fibres are closely and firmly packed together. It seems especially appropriate as applied to the appearances seen at the edges of large cysts.

structure¹ (and hence like the normal stroma), though with this difference—the fibres were loosely interlaced, in places widely separated, so as to leave interstitial spaces, which were occasionally packed with lymphoid cells. This tumor was also much more vascular than the other, showing the presence, not only of dilated vessels, but of many blood-extravasations. No degenerative changes, strictly speaking, were to be found. The general aspect of all the sections suggested the existence of a wide-spread edema, which had softened and separated the fibres, rendering the resemblance of the tissue to that of a myxoma very complete. With a higher power ($\frac{1}{5}$ obj.), the appearances in the neighborhood of the cyst were as follows: As the observer approached its wall, the loose tissue became somewhat denser in structure, the spindle-cells no more numerous, but in closer proximity to one another, until at the edge of the cavity they were arranged in parallel rows, and placed end for end, especially the most internal layer. It was easy to imagine how a row of these swollen cells, placed in regular order, could be mistaken on hasty examination for the remains of an endothelial lining, when their focus is a little different from that of the remainder of the field. Groups of round connective-tissue cells were not wanting; those of the branched variety were not so well defined. But of especial interest was the presence of collections of blood-corpuscles adjacent to the cyst, some of which were evidently derived from neighboring vessels, while the source of others could not be found. All through the tissue, little groups of three or four blood-cells might be seen, and the more carefully the sections were scrutinized, the more it appeared that this condition was a general one throughout the specimen, though most noticeable at the

¹ The arrangement of fibres and spindle-cells reminded the writer of a very interesting "recurrent fibroid" of the breast which he had an opportunity of studying.

Since writing this paragraph, the following passage from Klebs was observed: "Between the coarse muscular bundles, as well as between these and the connective-tissue sheaths of the vessels, may be observed everywhere narrow, slit-like gaps, which contain white blood corpuscles, and are surrounded by a fine boundary line, within which here and there lie nuclei. A cavernous structure thus originates, which is not found in the normal (uterine) tissue, and it is very probable that these cavities are to be regarded as *lymph-spaces* in which the blood-vessels and muscular bundles are suspended, as it were, by fine bands of connective tissue." (Handbuch der Path. Anat., 4th edition.)

locality before-mentioned. Within the cyst itself (and this is an important point), in spite of its probable age,¹ and adherent to its wall, was a fine network of coagulated fibrin, such as we shall so often encounter in our subsequent studies, holding in its meshes a few scattered corpuscles, which seemed to have come from one of the interstitial hemorrhages. After repeated searching for endothelial cells, under the most favorable circumstances, the writer came to the positive conclusion that there were none present, and probably never had been. And yet this was a cyst of small size, in which an endothelial lining ought certainly to have been present, if (as some claim²) it is found in others so much older and larger. But, on examining more carefully the solid portion of the fibroma, the observer came upon objects which had escaped him before—changes in the blood and lymph channels which denoted a serious disturbance of their functions.

Around the larger blood-vessels the spindle cells were arranged, as usual, concentrically and in firm, close order, but the intima was the seat of hyaline degeneration, which narrowed the lumen in some cases to a marked degree.³ The media, and even the adventitia, were also affected by the change. There was no doubt as to the real nature of the metamorphosis, since, aside from the characteristic staining⁴ of the hyaline material, it could not be distinguished from undoubted examples of the same, which the writer has observed elsewhere. Wieger's plates⁵ (*Virch. Archiv*, 78) figure like appearances in the vessels supplying lymph-glands. There were other abnormalities in the arteries. Many were largely dilated and choked with blood-corpuscles, while there were all degrees of extravasation, notably in one case, a hemorrhage *into the adventitia*. In other sections the

¹ "Age," as compared with the "geodes."

² Leopold (*Arch. f. Gyn.*, 1880), in describing a tumor, states that the larger (!) the cysts, the more apparent the endothelial lining (p. 408).

Vide also case cited by Dr. H. J. Garrigues in *JOURN. OF OBSTET.* for April, 1882, "On Diagnosis of Ovarian Cysts, etc."

³ So that the general endarteritis of chronic Bright's was suggested.

⁴ Vide Noeggerath (*loc. cit.*). The sections were compared with his original specimens and corresponded closely.

⁵ Wieger ("Hyaline Entartungen in den Lymphdrüsen." *Virch. Arch.*, 78) describes change as occurring mostly in the smaller arteries. The lumen may entirely disappear. Also Arndt ("Hy. Entart. in Gehirnarterien." *id. op.*, 49) In his cases the adventitia was not usually affected. Billroth mentions cases in which the change began in the adventitia.

vessel-walls had disappeared, whether as a result of long-continued pressure from within, or actual degenerative change, it was impossible to say, though the former supposition seemed more probable. Again, other lumina contained leucocytes, which were seen in groups within the cavity, between the layers of the adventitia, and scattered throughout the fibrous tissue surrounding the vessel.

The circulation through the lymphatic system seemed also to have been interfered with, judging by collections of small round cells scattered throughout the field. These at first appeared to be accidental, but against this view was their occurrence in regular isolated groups within well-defined spaces.¹ The condition was so like that in the blood-vessels that the natural inference was—this is a lymph-stasis, indeed it could be nothing else. No lining, endothelial or other, was seen at the borders of any of these cavities, nor could any lymph-vessel be recognized in their proximity (such as are confidently described by the later observers). Indeed, these collections of leucocytes were, as before stated, strictly circumscribed, and therefore confined within lymph-spaces, and not dilated lymph-vessels.

Turning now to the “geodes” or, as we prefer to term them, “commencing cysts,”¹ we find them to be rather peculiar, in fact not as typical, or as valuable for purposes of study, as many which we shall find in other fibrous tumors. Sections through several of these little bodies showed, beside the ordinary fibrin network in their interior, an absence of a clearly-defined limiting tissue. Spindle cells were few in number around these spots; along their edges there were none at all. The fibres did not always show the usual tendency to parallelism. Most remarkable were the dilated vessels and hemorrhages at the border of one of the spaces, the blood-cells escaping directly into the interior, or only separated from it by a narrow partition of fibrous tissue. In connection with the vascular changes around the large cyst and throughout the solid mass of

¹ An acknowledged inconsistency, since it assumes a fact, before it has been proved.

The writer has never been able to appreciate the exact fitness of Cruveilhier's term, though, for want of a better, it has been constantly employed ever since its origin. As regards its origin, the expression, “spot of softening,” “edematous patch” means quite as much. But as long as we regard these spots not as chance occurrences, but as the first beginnings of cysts, why not designate them by some name more definite than the term borrowed from mineralogy?

the tumor generally, the above facts are significant, and will be again referred to in connection with the question of etiology. Such is a review of the main facts gained by inspection of the present specimen. Any that have been omitted will be alluded to in the course of the next study, which will be to follow step by step the changes through which an edematous patch of microscopic size passes to reach the dimensions of an immense cyst.

The most instructive specimen obtained was a large fibrocystic tumor of the kidney,¹ which, on gross inspection, could not be distinguished from similar growths arising from the



FIG. 1.—Showing initial stage of geode-formation. A, Geode crossed by fine fibrillae of connective tissue. B, Loose fibrous tissue surrounding cavity. C, Blood-vessel. D, Small lymphatic (?), apparently connecting with the cavity (1/5 obj.).

uterus. The solid portion of the tumor was soft and edematous-looking, and many "mucoid"² patches could be seen with the naked eye. Microscopically the same fibrous stroma was apparent as in previous cases, yet everywhere loose and wanting in density. The softened spots certainly seemed to be composed of a "myxomatous" tissue, and this probably induced Dr. Garrigues, in giving his report of the specimen, to characterize it as

¹ Removed by Dr. Thomas at Woman's Hosp., Oct. 15th, 1881. Reported in *Med. News*, Jan. 7th, 1882. Also by Dr. H. J. Garrigues (*Med. Record*, March 18th, 1882, and also in previous number). The writer was able to examine the larger portion of the fresh specimen, but will be obliged to refer to Dr. Garrigues for a description of the cyst-contents, which that gentleman examined.

² A comparison suggested by Dr. Welch. Reference to Péan ("*Hystérotomie*," chap. iii., p. 82) furnishes the expression "mucous transformation," used in this connection.

a "fibro-myxoma"—an ill-defined, but convenient, term. The "geodes" were mainly studied by the writer; they were different in structure from others subsequently observed, since, instead of being surrounded by firm fibrous tissue, the vicinity of the patches presented a loose, trabeculated structure. As seen with a low power, the branched and spindle-cells scattered throughout this network served to strengthen the illusion that this was true myxomatous tissue. The smaller "geodes" were not cavities at all, but apparently only rarefactions in the midst of the dense stroma; in the larger ones there was a central clear

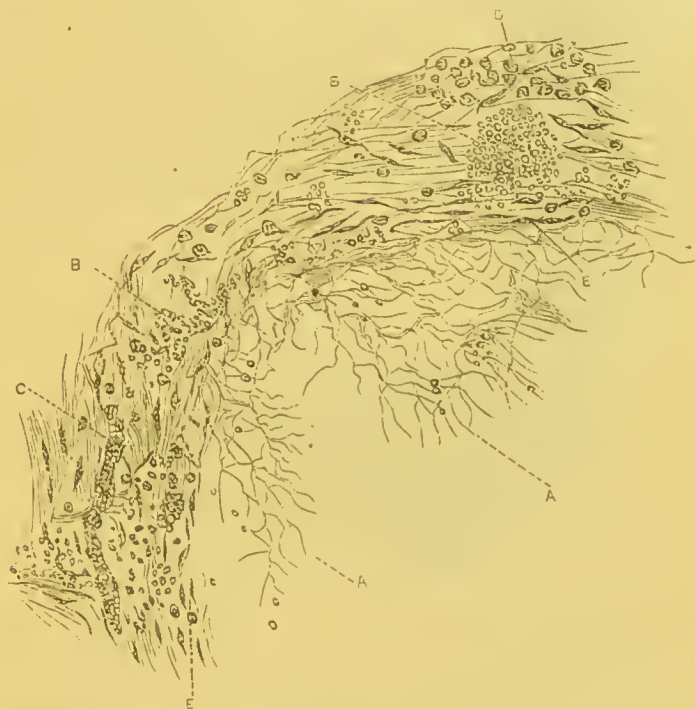


FIG. 2.—Geode in more advanced stage, surrounded by evidences of vascular changes. A, Fine network of fibrin adhering to wall of commencing cyst. B, Interstitial hemorrhages. C, Blood-vessel. D, Connective-tissue cells. E, Spindle-cells, arranged in parallel order along edge of cavity (1/5 obj.).

space, more or less encroached upon by fine tendril-like fibrillæ interlacing in every conceivable manner. In the large cavity figured (which to the naked eye recalled a cut section of the umbilical cord) there was nothing like a limiting wall, no trace of beginning condensation of the tissue, as at the edge of a true cyst. Looking at the whole field, the impression was that the cavity had been left by the forcible separation of the fibrillæ, the ends of which seemed to stretch out to meet each other across the intervening space. The loose mesh-work around the space spoke of a like tendency to separation, and the force, whatever it was, must have been *eccentric*. Such appearances as the

above are to be carefully distinguished from the artificial spaces formed in dense fibromata by forcible tearing apart of adjacent fibres. This is an accident in the preparation, and the network is much coarser, while the torn ends of the large fibrous bundles can easily be recognized.

Now, though the surrounding tissue in this case was so loose, it was less so than in the vicinity of smaller "geodes." Evidently there was an approach towards a cavity with a more regular outline, even at this early stage. With a higher power,



FIG. 3.—Section through a small cyst. A, A, I blood-vessels. B, Spindle-cells placed end-for-end at edge of cyst. The cells are somewhat swollen. C, Collection of connective-tissue cells. D, Is placed in the interior of the cyst ($1/5$ obj.).

the writer's views were materially modified. There was a disposition towards parallelism in the arrangement of the spindle-cells, though only over a limited area, as in the former specimen. These, together with branched cells, were numerous. The fibres themselves were seldom parallel, generally interlaced. The vascular supply was free.¹ To the writer's mind, the resemblance of this section to that made through the edge of the cyst previously studied seemed not so remote but what a possible sequence might be inferred. In the fresh specimen, the "geodes" were not empty, but each one contained a mass of semi-transpa-

¹ But there was no marked evidence of interference with the capillary circulation.

rent, gelatinous matter, proved to be made up largely of coagulated fibrin, including lymphoid cells in its meshes. Naturally, in the process of hardening, this delicate structure was destroyed. In the sections made by the writer, but few leucocytes were found. Dr. Welch,¹ however, states that the "gelatinous patches" contained "serum and numerous leucocytes."

Enough has been said to render it evident that we have here no ordinary "mucoid metamorphosis," neither a "myxomatous degeneration," any explanation of which changes, or reason why they should be of such limited extent and infrequent occurrence, is purely hypothetical. Even if one were content with the gross examination of the specimen, the doubt would immediately suggest itself, if this tumor be the seat of degenerative processes, why are they so widely isolated, so circumscribed, and yet so identical, no large softened spot being farther advanced than its neighbor of microscopic size?

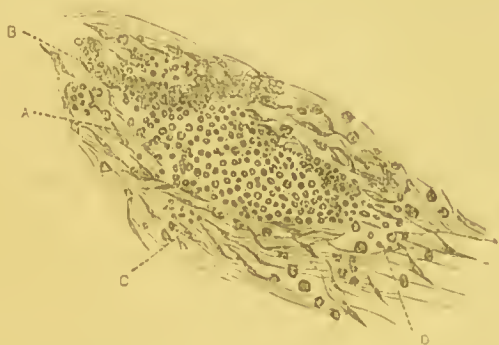


FIG. 4.—Showing lymphatic obstruction. A, Dilated lymph-space, packed with small round cells. B, Blood-vessel more deeply placed. C, Leucocytes, lying between the spindle-cells. D, Smooth muscle-fibres inclosing lymph-space ($1/5$ obj.).

And then, referring to a cavity of the size figured, how account for this by a simple mucoid change? The writer confesses his inability to accept this theory, and yet his experience with the microscope has been too limited to justify him in any dogmatic assertion. Long and careful study of normal connective tissue is necessary before one should be willing to assert positively that such a transformation may not occur.

Numerous other "commencing cysts" were examined from tumors of the uterus. All bore a general resemblance to those described, yet sets of sections from one tumor possessed personal peculiarities, which slightly distinguished them from a series taken from another specimen. The stroma surrounding some was looser than that around others, containing a less num-

¹ In his official report (vide *Med. News*, Jan. 7th, 1882).

ber of spindle cells and few parallel bundles of fibres. Some possessed more vascular neighborhoods, many no trace of vessels. In a few, the exquisite network of coagulated fibrin was preserved, clinging to the edge of the cavity, and inclosing blood-, lymph-, spindle-, or branched-cells. In other cases, the fibrillated connective tissue and fibrin were intimately blended, so that it was hard to say where the line of demarcation was. Yet the same type was preserved throughout; everywhere a tendency to circumscribed separation of adjacent fibres, from the first suspicion of rarefaction, up to the formation of spaces larger than a pea, a process in each case *beginning at a centre and radiating outwards*. If asked whether he had ever observed the formation of geodes in any other way than that above described, the writer would reply in the negative. This possibility has not been lost sight of, yet in no case has the element of hemorrhage, hyaline, fatty, fibrous, or any other sort of degeneration, appeared to be the *primary* cause of these peculiar patches. As far as he has a right to generalize from such incomplete observations, he believes that this process, whatever it may be, is originally *not a degenerative one*.¹

The writer committed himself, to a certain extent, when he spoke of these gelatinous masses in the beginning as "commencing cysts." Such he believes them to be, though he has never found a "geode" of sufficient size, or a true cyst small enough, to serve as a missing link between the two. We have only infancy and age before us to infer what the transition period must have been; yet the data are not uncertain, in spite of numerous lacunæ. The etiology of the initial softened spots explains their subsequent development. To this let us now turn, and before seeking light from the bibliography, try to find the clew for ourselves.

Of the two cysto-fibromata which the writer has been able to examine fresh, both showed on section moist, succulent surfaces. Fluid exuded from the interstices, obtainable in large amount on slight pressure. This fluid closely resembled serum in its physical and chemical properties; to all intents, it was serum. But the presence of serum in the midst of a mass of tissue is abnormal; it means edema. Edema² is connected with

¹ In no case has the observer ever found anything which could be construed into an epithelial, or endothelial, cell, either in the advanced or elementary stages of geode-formation.

² Wagner: Allgem. Path.

Flint's Practice, Introduction, pp. 33, 34.

changes in the blood-vascular system, with which, of course, these tumors must have been in direct connection; hence, the application to this transudation of the same explanations which hold good in any portion of the body. But closer inspection disclosed that the edema was not so general as at first appeared. It was confined to small patches, and in certain of these the fluid had coagulated—an unusual condition, if due to circulatory disturbance. Neither did the microscopic appearances strengthen the theory, for, instead of a general, loose, and spongy appearance, such as is seen in the subcutaneous cellular tissue elsewhere, the stroma in general preserved its density and coherence except in isolated spots. Again, though ectasiæ were frequently present, the tissue surrounding the dilated vessels was not as edematous-looking as it was in places remote from the capillaries. Excepting the anomalous state of things mentioned in a few sections of the ovarian cysto-fibroma, there was nothing to direct attention to the blood-system as the cause of the changes, and even there we noted changes in the walls and extensive extravasations, but not resulting edema.

This suggests the additional question, *was this condition edema at all?* understanding by the term the abnormal occurrence of serous fluid *outside* of the vessel in which it normally circulates, or is contained.¹ That it may have been present to a limited extent we cannot deny, but it does not account for the localized softening. It was remarked that each spot of rarefied tissue appeared to be formed independently, and as if by a force acting centrifugally. Everything suggested the accumulation of fluid in the interstices of the fibrous tissue, and remembering the wide distribution of lymph-spaces in similar regions, the inference was natural that the latter were the sources of the initial changes. By examining the very earliest signs of rarefaction, the resemblance between the spaces so formed and interstitial lymph-channels, as figured by the later histologists, was perfect. This fact, taken in connection with

Cruveilhier (op. cit., p. 702) mentions a case where an ante-mortem diagnosis of fibrous tumor of the ovary *with edematous softening* was made. It proved to be a phlebotaxis.

¹ Cruveilhier, op. cit., p. 680. "These tumors (fibroids) are quite subject to edema, which belongs to the same category as that due to obliteration of veins. This edema may soften the whole tumor," etc. One author actually professes that he has seen dilated lymph-spaces lined with endothelium in direct communication with similarly lined lymph-vessels. We have observed a lymph-vessel apparently communicating with a "geode," but could not trace such a close connection as this writer.

the frequent occurrence of leucocytes in the commencing cysts, still further strengthens our suspicion. And when we recall the marked evidences of lymph-stasis and lymphangiectasis (to use the formidable expression of Leopold), found in the cystic tumor first examined, we are ready to say: "Why seek further? This entire process is simply one of lymphatic dilatation." Referring to the literature of the subject, we see that such has been the course of reasoning pursued by many other observers, and such the deductions made. Yet most of the writers have expressed the utmost confidence in the results obtained, which is quite different from the negative stand taken in this paper. But, briefly, what are the prevailing opinions?

It is significant that a quaint old book¹ published nearly a century and a half ago should contain this passage: "That the Lymph or Milk may produce these Tumors (*i. e.*, fibro-cysts of the uterus), it is necessary that their circulation should be intercepted or impeded. For whilst they freely circulate, they can never form any obstruction." Again, "It appears that the Cist of these Tumors is nothing else but the tunics of the lymphatic Gland or Vessel, or Vesicula lactea of the Uterus, which, though naturally very small, frequently acquires the Bulk of a large Egg through the Ductility, or I may say, Dilatability of the said Tunics; but this should be brought about gradually and without Force, otherwise these thin Membranes, which I may compare to cob-webs, may be burst." The writer has copied this paragraph entire, because it is a remarkable one, expressing only a theory, and yet agreeing wonderfully with the minute investigations of Virchow and Cruveilhier,² conducted many years later with the aids of modern science. It is rather strange that no later writer has referred to the above passage; to the best of our knowledge, it has hitherto been unnoted. Virchow³ had evidently not thought of referring his "cystic metamorphosis" to the above cause, since he merely remarks that "the vessels are often dilated, and there are true exudations, especially of blood—myoma hémocystique."⁴ A great deal has been written about the "*corps fibreux à géodes*" of Cruveilhier,⁴ so that one finding the frequent references to his work, is prepared to turn thither and find all his doubts dispelled. But, in reality,

¹ Astruc, *Dis. of Women*, p. 232 et seq.

² Cruveilhier alone was the first to investigate this particular mode of cyst-formation.

³ *Op. cit.*, tome iii., p. 413 et seq. (French trans.).

⁴ *Op. cit.*, p. 689 et seq.

the originator of the expression is neither clear nor satisfactory in his definition of it. After speaking loosely of the cavities in ovarian fibroids as "kystes aréolaires," he continues: . . . *geodes qui sont la conséquence de l'œdème dont la liquide infiltré d'abord dans l'épaisseur du corps fibreux, se réunit en masse plus ou moins considérable dans une cavité anfractueuse,¹ et dont les parois sont constitués par les lobules dissociés du corps fibreux lui-même.*" In another place, there is found the expression "areolar or geatiniform cyst," and it is said that, "on first opening these cysts, it looks as if the gelatiniform material was unorganized—the areolar structure comes out on careful examination."

This mysterious appearance, we have seen, is due to nothing more nor less than coagula of fibrin. What impression can we derive from this, except that the pure speculation of old Astruc carried him nearer to the ultima causa than the practical investigations of the eminent French pathologist? We shall not delay to quote statements which are simply borrowed or unsupported by facts. Péan,² writing at a somewhat later date, refers to the origin of uterine fibro-cysts from dilatation of the lymphatics, and opposes the theory. This proves that it must have been started before. Occasional references are indeed made to this method of cyst-origin, but Leopold³ is the first contemporaneous writer who resumes the subject as if he meant to study it thoroughly. His earlier exhaustive papers on normal lymph-distribution⁴ entitle him to greater consideration than any one who has preceded him. His views are briefly these: The cysts within the "lymphangioma kystomatosum" arise from a dilatation of the lymph-spaces, due to an obstruction of the channels, the fluid accumulating and forcing asunder the tissue. The ultimate cause of this obstruction may be a sort of "axendrehung" of the pedicle of the tumor, through which the large lymphatics run.

¹ A very appropriate term, as will appear from reference to the drawings.

² Péan et Urdu "Hystérotomie," chapter iii., p. 82 et seq.

To again quote Klebs, "In a like hyperplastic way can the vessels of the fibro-myoma develop; the lymph spaces dilate to *smooth-walled* cysts, *destitute of a special membrane*, and filled with clear limpid fluid . . . simple cysts of considerable size are known, which are surrounded on all sides by muscular substance . . . a softening of the walls seems to have introduced the enlargement of the cystic lymph-spaces, etc."

³ Arch. f. Gyn., Bd. vi., 1874, p. 189; also Bd. vii., 1875. Report of cases of "myosarcoma lymphangiectodes," by Fehling u. Leopold.

⁴ Id., Bd. iv.

Later he reports what he considers a test case, wherein "these spaces look like the normal lymph-spaces of the uterus," but he confuses the question by claiming for "venous stasis," "edema," "myxomatous degeneration," etc., a share in the formation of cysts. We do not doubt the occurrence of the first two conditions (or rather of edema, resulting from stasis), but why mention them only to divert the reader's attention from the main issue?

Rein,¹ following the course indicated by Leopold, has given the most complete description of commencing cysts which the writer has yet seen, and one which corresponds closely with the appearances already mentioned. But when we read that some spaces were lined by "eine ununterbrochene Schicht von Endothelzellen," we must confess that he has been more highly favored in his studies than we. Naturally the only inference to draw from such a condition (real or fancied) was the one stated by Rein, viz.: These spaces are lined with endothelial cells, hence they must come from dilatation either of lymphatic- or blood-vessels. But the latter are observed throughout the specimen to be of regular form and sharply separated from the rest of the tissue, while the "Hohlräume" are irregular and their boundaries ill-defined. Moreover no blood-corpuscles are found in them. Hence they must arise from dilated lymph-spaces.² There is a doubt in the writer's mind as to what Rein understands by a "lymph-space." If the modern theory is accepted (and too much careful work has been put upon the histology of the lymphatics to admit of doubt that the interstices of connective tissue form one vast series of intercommunicating lymph-channels), it is not correct to say that every such space is lined by endothelium. This may apply to the vessels with regular walls, but hardly to the irregular spaces.³ Furthermore, it is strange that

¹ "Lymphangiectatic Fibromyomata." Arch. f. Gyn., Bd. ix., 1876.

Leopold (Arch. für Heilkunde, 1873, p. 44) in reporting a case of uterine fibro-cyst, says: "In many places are seen fine vessels with endothelial-lined walls. In some places adjacent capillaries are fused together by melting away of their walls." Ampullæ are found in places. "Es scheint als ob in jener hellen Schicht sich aus feinsten Capillären die ersten Anfänge der Cavernen bilden." The cavities are lined with endothelium, hence they come from dilated vessels. As said before, these appearances have been rarely observed.

² Rein explains that only the "youngest" spaces had an endothelial lining. In the walls of the older ones there was often found fatty degeneration (!).

³ Leopold takes a contrary view. This subject is still too little understood to admit of positive assertions.

neither Leopold nor Rein has noted the occurrence of circumscribed collections of leucocytes,¹ which (excluding inflammations, and diapedesis from temporary capillary stasis) certainly points to some disturbance in the circulation; nor has either of these writers mentioned the frequent presence of lymphoid cells within the coagula which fill the interior of freshly-cut geodes.

This has brought us back to the original point to which our own investigations led us, and, to tell the truth, not much farther. There still remains the possibility that the so-called "edematous patches" are not due to edema,² but to lymphangiectasis (either spaces, or true vessels, or both, being affected); credible witnesses testify to the truth of this, saying that they have observed the process in its very inception, as it were. Yet the verdict not proven is the only one which can conscientiously be given, and this is the conclusion to which the writer's honest endeavors to find the truth have brought him. Having disposed (unsatisfactorily, it is true) of the etiology of geode-formation, we are prepared to trace briefly the growth of the resulting cysts.

We shall employ the theory of lymphatic dilatation as the most plausible one, though regarding it as but a theory. We have seen how the microscopic spot of softening gradually extended, chiefly as the result of the pressure from within, partly, doubtless, by the infiltration and softening of the neighboring tissue. A true general edema may assist in the latter process. The coarse network of fibrous tissue became finer and finer, the meshes farther apart, as they yielded to the separating force of the contained fluid, until finally the interlacing fibres were torn

¹ Since writing the above the following passage was read in Klebs (op. cit., Tome ii., p. 822). In speaking of a sarcoma of the ovary he says, "it often contains spaces filled with gelatiniform fluid, rich in lymph-cells."

Leopold (Lymphgefäße des normalen, nicht-schwangeren Uterus) thinks that the smaller muscular bundles are covered with fine veils of endothelium, and hence every lymph-space, no matter how small, must be lined with endothelial cells. His observations, it is unnecessary to say, were made upon *fresh* tissues. The point is a very delicate and doubtful one.

² Leopold (loc. cit.) also claims by induction of artificial edema, to have brought out a complete network of endothelial cells running throughout the tissues (of the uterus) and connecting by branching processes with the corresponding cells lining the lymph-vessels proper. It would be well if such thorough investigations were instituted in the normal ovary, yet the analogy between the two organs is close enough to furnish material for a pretty theory.

asunder and a small cavity was formed. Having overcome the first obstacle, we observed that the spaces rapidly increased in size, as the fluid accumulated in larger amount, and at the same time there were evidences (in the most advanced "geode" examined) that the tissue along the edges of the open space was becoming more condensed by reason of the long-continued pressure. Fibres and spindle-cells arranged themselves in rows more or less parallel, and the first suggestions of a limiting wall appeared. At the beginning of this division of the subject, attention was called to certain vascular peculiarities in the vicinity of commencing cysts. It is fair to infer that any influence which causes a lymph-stasis will also interfere with the capillary circulation, and hence edema, extravasations, etc., which act as secondary agents in promoting the rapid expansion of the growing spaces; a sudden accession of fluid, such as might come from the rupture of an adjacent capillary, would greatly increase the pressure upon the sides of the cavity, and serve both to extend its limits and to condense the surrounding tissue. There at length comes a time when we may dignify this cavity by the name "cyst," and call its contiguous tissue a "wall." When

Wilks (Trans. London Path. Soc., vol. ix., p. 299) presented a fibro-cyst (ovarian) before the London Path. Society, upon which a committee of eminent pathologists submitted a report. They decided (1) That it was impossible, from the difficulty in isolating them, to decide as to the presence or absence of smooth muscle-fibres. (2) The size of the tumor and its relation to the *ovary and tube* are the most important diagnostic points. (3) "The walls of the cysts have the same structure as the solid tissue of the tumor; the only difference being that the fibres are arranged with greater regularity and often appear to form *parallel bundles*, a difference depending probably upon the *stretching to which the parts have* been subjected by the distention of the cyst by fluid." It will be seen that the above deductions correspond closely with those obtained from our studies.

¹ Comp. Gusserow, who says of these cavities "sie sind einfache Gewebzlücken, keine wirklichen Cysten" (op. cit.).

Consulting his notes, made at the time of observation, the writer finds reports of various interesting tumors, for example: Case I, Fibro-cyst of uterus (removed by Dr. Thomas, Woman's Hospital, July 6th, 1881). It is filled with small cysts which *do not communicate* (as was the case in one of Waldeyer's cases). Contents pale-yellow, specific gravity 1025; spontaneously coagulable. Hemorrhages seen on section. In some places the tissue presents a curious honey-combed appearance. Many blood-vessels and lymphatics immensely dilated. *No trace of epithelial lining* in commencing or advanced cysts. Smaller cavities filled with coagulated fibrin; many "geodes" surrounded by dilated vessels. Case II. Tumor right ovary; malignant? (Emmet, Woman's Hospital, May 20th, 1877). Same appearance of "geodes" packed with leucocytes and blood-corpuscles. Note

this transition period is passed, our sections have not informed us. Cysts have been mentioned in ovarian fibromata not larger than an acorn; doubtless a careful examination of such small cavities would furnish valuable results. The only one which the writer ever thought that he had found proved to be a cystic ovary, with advanced fibroid thickening. Having reached the cystic stage it becomes a familiar pathological object, and does not need further elucidation, since it has been thoroughly described by authors. When the *eccentric* changes, thus far spoken of, have reached a certain degree, those of a *concentric* nature begin. Such are, softening and maceration of the wall from long bathing in the contained fluid, anemic necrosis of the same from sustained pressure, repeated hemorrhages by rupture of mural vessels or diapedesis. To these may be added granular and fatty degeneration, and (a rare change) hyaline degeneration. The writer can hardly refrain from mentioning this latter condition, observed in the wall of an advanced cyst, in connection with the hyaline metamorphosis in the walls of the blood-vessels. The relation is just about as clear as that between the endothelium lining a lymph-vessel, and the cellular layer which is thought by some to cover the wall of a fibro-cyst.¹ Thus by gradual growth, and as the combined result of various forces, arise the immense cystic formations, which bear within their interior traces of the successive changes to which they have been subject. Sections through their walls, in all specimens seen by the writer,

curious staining of coagula within the cavities, looking very much like hyaline metamorphosis. The basis of the tumor consists of loose tissue with branching cells, in many places full of leucocytes. Probably cancer? *No epithelial lining to cysts.*

Case III. Cysto-sarcoma of ovary (Sims' private case, April 4th, 1880). Cannot distinguish many sections from normal stroma. The *angiomatous* tendency of the tumor is marked. General lymphatic thrombosis; numerous dilated vessels, also cavities containing fibrin network; holding in its meshes blood-corpuscles and leucocytes. General diapedesis of blood-cells. *No trace of epithelial lining to cysts*, the only wall being the condensed tissue, with spindle-cells arranged in parallel rows. Tissue throughout very fine and dense.

Case IV. Large fibro-cyst of uterus (Bozeman, Woman's Hospital), same general structure as in other case. "Geodes" few in number and *without epithelial lining*. Large old central cyst with degeneration of walls.

¹ Which cells have never been found either in the fluids, scrapings, or hardened sections of the specimens examined by the writer (five in all). Comp. also Gusserow (op. cit.), who denies an endothelial lining to these cysts.

show dense, parallel fibres, which give the impression of having been firmly crowded together by a force acting from within the cavity, since, a short distance away from the wall, the tissue assumed its ordinary appearance.¹

A discussion as to whether a cellular lining is ever present in this variety of cysts would be unprofitable, considering the great difference of opinion which exists. Many statements have been made by reliable observers to the effect that such is the case. To quote only one—so great an authority as Waldeyer² reports a fibrous tumor of the ovary containing two small cysts (the size of walnuts), lined by “low, cylindrical epithelium.” “Nowhere else,” he adds, “was epithelium to be found. Hence these formed *the only remains of the epithelial parts of the ovary.*”

This deduction, to be expected in one who had already laid such stress on the development of the cystomata from embryonal epithelium,³ was made before the lymphangiectatic doctrine of Leopold was elaborated. If cells were found at all, we should expect them only in such young cysts as the ones above mentioned, where we should regard them as either pointing to a true vascular dilatation, or as marking the (hypothetical) “follicules hydropiques” of Virchow. The writer does not feel prepared to offer an opinion upon this question, not having made a sufficient number of observations. He has never been fortunate enough to discover a single endothelial or cylindrical epithelial cell in the interior of these cysts at any stage of their growth or decay. As to their occurrence in the older ones, it can only be said that this is contrary to what we should expect. In a wall, subject to degenerative processes itself, and in long contact with a fluid, we cannot think it probable that a delicate cellular membrane would be preserved, when the firm fibrous basis upon which it is seated cannot withstand the pressure. And that this lining epithelium should persist all through the life of the cyst, from its earliest beginning as a dilated lymph-vessel, up to a cavity ten thousand times the dimensions of the original, is a supposition so contrary to the facts which we have observed

¹ Dupuytren has compared these cavities, not inappropriately, to the cavities of the heart (Virchow, “Tumeurs” Tome iii., p. 390). Virchow distinctly says that “fibro-cysts of the uterus have *no lining membrane.*”

² Archiv f. Gyn., Bd. ii., p. 440.

³ Vide “Eierstock u. Ei.” “Eierstockskystome,” Arch. f. Gyn., Bd. i., S. 252. Also Malassez et de Sinéty, Arch. de Physiol., 1878, i. and iv.

elsewhere,¹ that we consider it untenable. A great deal has been said, especially by clinicians, upon the contents of fibrocysts and their value in differential diagnosis; doubtless too great stress has been laid upon this point, as also upon the examination of suspected ovarian fluids.²

Until a "geode" has reached a certain size, or until its contents have become mingled with products of disintegration or blood-extravasation, the writer has always found a clear serous liquid, spontaneously coagulable on exposure to the air.³ In fact, he received but one specimen in which the coagulation had not already taken place, and hence the peculiar semi-solid patches which have always been so mysterious to microscopists—the "gelatiniform," "mucoid," "myxomatous," "colloid," metamorphosis of authors.⁴ Acetic acid gave no mucin reaction in the above spots. This is different from Gusserow's⁵ experience, who states that the fluid found in the interstitial tissue of fibroids *does* contain mucin. However, he evidently makes a distinction between these spaces and true "geodes," for he speaks farther on of the latter as "filled with a fluid which

¹ In various cystomata of the ovary, from the lining wall of which the epithelium is often missing, as the result of retrograde processes.

² Vide Drysdale's original paper in Trans. Am. Med. Ass'n in 1873. Also Garrigues (AM. JOURN. OF OBSTET., January, 1882), who gives the literature of the subject. Westphal in particular is a thorough observer, Arch. f. Gyn., Bd. viii., 1875.

³ Most of the specimens obtained from the Woman's Hospital were not examined till the day following their removal by operation.

⁴ Garrigues (New York Medical Record, March, 1882) states that he noticed no clot in the fluid of these small cysts after standing two days (!). The writer found clots within the "geodes" of the same specimen.

Noeggerath suggests that this property of coagulation is only due to admixture of the cyst-contents with *blood*. Garrigues, on the contrary, has seen absence of coagulation even with bloody fluid.

⁵ Neubildungen des Uterus, p. 102. He also speaks of nucleated round cells contained within these spaces.

Koeberlé (Gazette Hebdom., 1869, p. 136 et seq.)—"Only fourteen cases of ovarian cysto-fibromata reported up to this time (1869)." Fluid coagulates spontaneously on exposure to air. Koeberlé says positively that these cysts are of *lymphatic* origin.

Schmidt (Schmidt's Jahrb., 1866, p. 129) describes an "Erweichung durch Oedem," which gives rise to the "geodes" of Cruveilhier, and distinguishes cavities thus formed from "Pseudocysten, die sich durch Erweichung fester Fibroidmassen bilden." The former are often lined with epithelium. This article is as obscure as it is exhaustive, and leaves in the reader's mind the opinion that the author has not adhered closely to his divisions of the subject.

resembles lymph chemically, and in fact *is* lymph; this fluid coagulates spontaneously on standing, etc.” Spiegelberg examined such fluid, and found that it contained serum-albumin, but no mucin or paralbumin.¹ Gusserow later obtained a similar result. When we come to the larger cysts, we find fluid of a less homogeneous character, and containing various foreign elements. Without going into the interesting matter of differential diagnosis, the writer would simply state as his opinion that it is impossible in the present state of medical science to infer that an abdominal tumor is of a fibro-cystic nature, from an examination of one, or several specimens, of fluid. Our studies thus far have shown us that, after a certain time, the cyst-contents lose their original characteristics; how, then, can we lay much stress upon their physical and chemical properties? “The fluid is transparent(?), of a deep-amber color, and very thin when first drawn, but forms a hard and firm coagulum in a little while, which in a few hours shrinks, and separates into a clot and a thin watery serum. It coagulates by heat, and resembles in every respect the liquor sanguinis. Under the microscope, few cells appear in it. There are epithelium,² oil-globules, and a fibre-cell. This (*i. e.*, the fibre-cell) is a characteristic of the structure in which the cyst originated.” The above paragraph, copied verbatim from an eminent authority³ on gynecology, gives a fair clinical view of the question. Yet any pathologist, having simply the above data, would be very bold indeed to offer a positive opinion. The “fibre-cell of Atlee”⁴ has not yet attracted much attention; indeed, it occupies about the same position as the “grouped cells” of Thornton.⁵ Until Drys-

¹ Oskar Schröder (Inaugural Dis., 1872)—“Cysto-fibroids des Uterus”—could not detect mucin. He urges the spontaneous coagulation of the fluid as a diagnostic point.

Heer (Inaugural Dis., Zürich)—“Ueber Fibro-Cysten des Uterus.” In a very superficial and disappointing paper, he merely touches on the examination of cyst-fluid by the coagulation and heat-test. He attempts no explanation of cyst-formation.

² Note the word “epithelium”—a most misleading point on which to found a diagnosis.

Atlee is rather sanguine about the value of examinations of doubtful fluids, yet he looks at the subject from a clinical, rather than pathological, stand-point.

³ Thomas, Dis. of Women, last ed., p. 557.

⁴ Vide Atlee, “Ovarian Tumors,” p. 263.

⁵ The writer has examined two specimens of fluid containing “grouped cells,” and seen the ante-mortem diagnosis of cancer confirmed by autopsy.

dale's corpuscle' has had its identity firmly established, it seems to be only multiplying theories to bring forward fresh examples of so-called pathognomonic cells. The writer has not seen the appearance which Atlee mentions, except in commencing cysts, where he regarded it as an ordinary spindle-cell. In the mixed fluid of an advanced cyst, with degenerated walls, it seems improbable that such an element should preserve its integrity.

It may have seemed all through the course of the argument as if the writer, while dwelling upon the theory of lymphatic dilatation, had carefully avoided any suggestion concerning the cause of the assumed stasis. This is just where the weak side of the whole question appears, and unfortunately little can be done to strengthen it. The theory had no sooner been advanced in the first place than the same objection was raised.² If the writer has asserted that there was present in the specimens examined evidence of interference with the circulation in the morbid growths, it was because he observed the same appearance here which obtains elsewhere, under known conditions of obstruction. Whether the inference was correct or not, of course we cannot tell. It is equally true that it cannot be proved to be incorrect. Hence, as we must employ a theory to explain those morbid processes for which we can discover no sure cause, the most plausible one is certainly to be preferred.

In the case of uterine fibro-cysts, the accumulation of lymph was attributed to "pressure upon the afferent vessels through the increased growth of the tumor." "Axendrehung," or twisting of the pedicle, was suggested by Leopold (an old idea, opposed by Péan, who examined fibro-cysts, having long, slender pedicles without the least signs of strangulation of the vessels), fibrous thickening of the pedicle by another. Contraction of the capsule, old adhesions,³ general disturbances of the sys-

¹ Fluids from a true peritoneal cyst, cyst of the spleen, etc., have yielded Drysdale's corpuscles on careful examination.

Few will agree with Dr. Thomas in his confidence in Foulis and Thornton's pathognomonic cells. Garrigues (loc. cit. in AM. JOURN. OBSTET.) refers to the "grouped cells." The writer has studied them, but without definite results; in his opinion, observations are as yet too few to lead to any valuable deductions.

Rein suggests that one should plunge a trocar deeply into the tumor, in order to avoid admixture of the fluid with blood. He denies that a true "fibroma lymphangiectodes" has ever been found in the ovary.

² Vide Péan, loc. cit.

³ Leopold (loc. cit.) says that adhesions are not common in the case of

temic blood- and lymph-circulation—all of these external agencies have been invoked to account for the intrinsic changes. The writer does not hazard another guess, but would call attention to the fact that these tumors are made up of contractile elements; that they are subject to well-known changes in size, and that there is no reason why local circumscribed contractions should not be constantly occurring, such as would compress the delicate vessels and lymph-spaces, giving rise to temporary stasis.¹ However that may be, the specimens obtained by operation and autopsy have merely confirmed the supposition that there was an impediment to the vascular supply in the pedicle. And the conditions suggested are even less likely to be present in the case of fibromata of the ovary. To tell the truth, the entire subject of lymphatic distribution and the mode of circulation of the lymph through its various channels, has still a veil of mystery hanging about it. The physiology of this vast system being so imperfect, what wonder that its pathology is obscure?²

ovarian fibroids. The pedicle is generally short and broad, with free vascular communications. The tube lies free from the tumor.

There is no evidence that the causes suggested were actually observed on autopsy. Van Buren was one of the first to call attention to the twisting of the pedicle in abdominal tumors. Later writers frequently refer to his early cases (1850). The writer has never (in upwards of fifty cases) seen an instance where any interference with the vascular supply in the pedicle could be suspected.

It is certainly not without reason that we should imagine the presence of local adhesions around these tumors or circumscribed inflammation of the capsule, such as would constrict the vessels. Such, however, the writer has never heard mentioned.

¹ It is unnecessary to quote cases to prove the changes in size which may occur in fibroids under various influences—pregnancy, ergotin injections, etc. These cannot be explained by variations in the calibre of the *vessels* alone. Doubtless this local contraction within such tumors will explain many otherwise inexplicable cases of necrotic softening.

² The suggestion of Leopold that the accumulation of lymph within fibroids may act as a drain upon the general system is amusing. How much lymph is removed from the general circulation, and what means have we of knowing anything about it?

The subject of "Lymphatic Dilatation," as a surgical disease, is very limited. A few cases are reported in old numbers of the *Lancet*, for which no cause could be ascertained. Handfield Jones (*Lancet*, Vol. ii., 1875) cites one in which he considered that the *lymph-spaces* themselves were affected. In no instance was the thoracic duct compressed.

Wedl (*Virch. Arch.*, No. 75), in an article on *Thrombose der Lymphgefäße der äusseren Haut bei Carcinoma Mammæ*, observed the interstices of the tissues to be crowded with lymphoid cells (as in my speci-

Some confusion has been caused among writers by the description of another variety of cystic growth, called loosely "areolar," "fibrous," "hypertrophic" cysts, or "cysts with fibrous thickening." It is quite unnecessary to place these in a separate class; still less to regard them as having any connection with the subject of this paper. They are merely ordinary ovarian cystomata, in the walls of which there has occurred an overgrowth of fibrous tissue, so that on section one is reminded of the dense, parallel fibres, which are so familiar, lining the cavities in fibromata. The writer has examined the thickened walls of multilocular cysts, and has found nothing to indicate a difference between them,¹ and the parietes of other cystomata. For, 1, the contained fluid is identical; 2, the fibrous increase is always limited and in spots; 3, numerous secondary cysts are found without thickened walls; 4, at some point the distinctive epithelial lining will be preserved; 5, the *tout ensemble* of the tumor will prove its origin.²

At this point the writer will be obliged to conclude a paper of the indefinite and unsatisfactory results of which he is clearly aware. The subject was a difficult one to begin with, his own training in the use of the microscope imperfect, and his judgment naturally immature. In trying to preserve an independent attitude towards previous observers, he may have assumed an apparent self-confidence which he is far from possessing. As was stated in the introduction, he did not set out with the idea of making any new and original observations, nor has he done so. Unbiased by the weighty opinions of eminent authorities, he could not pretend to be, yet from his own personal observations, as set forth in the preceding pages, the following deductions may be drawn:—

1. Fibrous tumors may, and do, arise from the ovary, independent of the uterus or the other adnexa.

mens), and he thought that he detected a true out-wandering from the lymph-vessels themselves.

Foà (id., vol. 62) demonstrated by injections the close relation between the vessels and extra-vascular lymph-spaces. By injecting the bulbus aortæ in a frog, he obtained under moderate pressure injection and dilatation of the spaces.

¹ Gallez, in particular, has noted a separate class of "fibrous cysts." It is to be remarked that Thomas, in his last edition, also calls attention to the difference between these and true cysto-fibromata.

²The writer once found extensive fibroid thickening in a very young cyst. But its association with other cystic formations and the remains of the ovary showed its origin.

2. In structure these tumors are true fibromata, yet peculiarly rich in long spindle-cells, which closely resemble those of the normal stroma; hence,

3. These fibromata originate, not by a local change, but as the result of a general hyperplasia of the ovarian stroma. Moreover, there is nothing to show that this process is of an irritative, or inflammatory, character.

4. The resemblance between microscopic sections of ovarian and uterine fibroids is so close that the differential diagnosis is very difficult, if not impossible.

5. Cysto-fibromata of the ovary, like those of the uterus, are of secondary formation, and result from changes in previously solid tumors.

6. Such cysts probably arise from the so-called "geodes" or "gelatinous patches."

7. These "geodes" do not represent any form of degeneration at all, but are dilated connective-tissue spaces, filled with a coagulable serous fluid, resembling lymph.

8. The "geodes" are probably dilated lymph-spaces, which expand by reason of the accumulated fluid in their interiors—a condition due to a general stasis.

9. That *lymph-spaces* rather than *lymph-vessels* are the seat of these changes is evidenced by their irregular shape, intimate relation with the surrounding tissue, manner of dilatation, and absence of endothelial lining. But that the proper vessels may also dilate in like manner is not improbable.¹

10. Simultaneously with the lymph-stasis, there often exists a disturbance of the blood circulation, giving rise to edema, extravasation, and various local changes, but these are factors in the *subsequent growth*, not in the *origin* of a "geode."

11. Commencing cysts grow by increase of the contained lymph, by accessions of blood and serum from adjacent vessels, and by degeneration of the surrounding tissue.

12. At no time in its history does a cyst possess a proper wall, since what at first appears to be such is merely the surrounding fibrous basis of the tumor, condensed by long pressure. A cellular lining upon the apparent wall of a fully developed cyst (originating like those referred to in this paper) is certainly very rare in a young growth, and highly improbable in the case of one of advanced age.

¹ Comp. the "Ampullæ" observed by Leopold.

13. The fluid found in these cavities has originally the properties of lymph, but becomes so changed by intermixture with other elements, that its examination for clinical purposes does not furnish positive results.

14. The *ultima causa* of dilatation of the lymph-channels and consequent cyst-formation in fibroid tumors is unknown. Clinical observations lead to the inference that, in many cases, the active influences are *within* the growth itself.

During the composition of the first part of this paper, a new light was thrown upon the subject by the examination of a small ovarian tumor, received immediately after removal.¹ It was a little smaller than an English walnut, smooth and lobulated, possessed a well-marked capsule, and a long, slender attachment which looked like a pedicle. It was doughy to the feel, and on section showed a soft, homogeneous, non-fibrous structure. Exactly in the centre of the mass was an exquisite little cyst, not larger than a pea, with a perfectly defined wall and a clear serous contents. Examination of the fluid yielded numerous groups of cells of an endothelial nature, a few blood-corpuscles and lymphoid cells, and clumps of very delicate interlacing fibrillæ, not to be distinguish from coagulated fibrin. Several scrapings from the (fresh) wall gave the same result, with the addition of cells closely resembling pavement epithelium. The fresh tumor was now injected with Berlin blue, the needle

In their clinical aspects, fibromata and cysto-fibromata rank with other solid tumors of the ovary, the cystic variety being of more importance from their larger size. The necessity for operative interference not rarely occurs (Spiegelberg reports an ovarian fibroid of eighty pounds weight). The diagnosis could only be made by exclusion, and would not be positive. A benignant tumor might be reasonably suspected in the absence of the usual signs pointing to carcinoma or sarcoma (vide cases of Atlee and Peaslee; Van Buren in N. Y. Med. Journ., 1850, vol. i., p. 159).

Thomas (Am. Jour. Med. Sci., vol. lxxi.), Double Ovariectomy—Rare Case of Adenoma Ovarii.

It will be understood that this is not a *clinical*, but a *pathological*, study. The same rules as to differential diagnosis and treatment apply here as in the case of other abdominal tumors (vide Olshausen, Spencer Wells, Atlee, Peaslee, et al.).

¹ Kindly sent by Dr. Thomas; removed from private patient. On opening the abdomen, general cancerous disease of the omentum was discovered and the wound was closed, only this ovary being removed. Whether the disease was primary or secondary in the ovary is not certain, probably the latter. (Indebted to Dr. Welch for the specimen.)

of the syringe being introduced quite superficially beneath the capsule. Under moderate pressure a beautiful net-work of lymphatics burst into view near the point of insertion, and at the same time a similar injection was seen on the inside of the cyst-wall. The same result was obtained in two trials. A natural inference was, that here was a cyst, with a regular endothelial lining, in direct connection with the lymphatic system, hence a dilated lymphatic, surprised in the very act. But unfortunately for the integrity of the theory, on hardening the specimen, and making sections through different parts of it, it was found to be distinctly cancerous in nature, though the alveoli were quite small and distributed in a curiously irregular way. Some of them were in the immediate vicinity of the cyst, one in particular invading its wall. No cell-lining to the cyst could be discovered, so that the probability is that the cells found in the fresh fluid and scrapings had escaped from the alveoli. The stroma of the tumor was generally myxomatous, except around the cyst, where parallel rows of spindle-cells were seen in the midst of fibrous tissue. Sections through the cavity itself proved that the injection had indeed penetrated through the entire thickness of the mass by means of the lymphatic channels. In some places the coloring was general and not sharply defined, probably where it filled interstitial spaces, but at the very edge of the cavity there was a clearly marked branching vessel, such as those figured by Leopold and Recklinghausen. No endothelial lining was brought out in these vessels by the method of staining employed. Although this tumor did not belong to the class which we have been studying, it has been mentioned because of the opportunity which was afforded for testing the results of injection in the fresh specimen. Doubtless the relation of the lymphatics is the same as in the benignant growths. We hope some day to have an opportunity of confirming in this way the statements of authors with regard to the "fibroma lymphangiectodes."¹

¹ In the writer's opinion, future investigations will be most valuable according as they are made by means of *careful injections of fresh tumors*. Only by establishing *positively* the relation between the dilated spaces and the lymphatic system, can we hope to clear up the doubtful origin of the commencing cysts.